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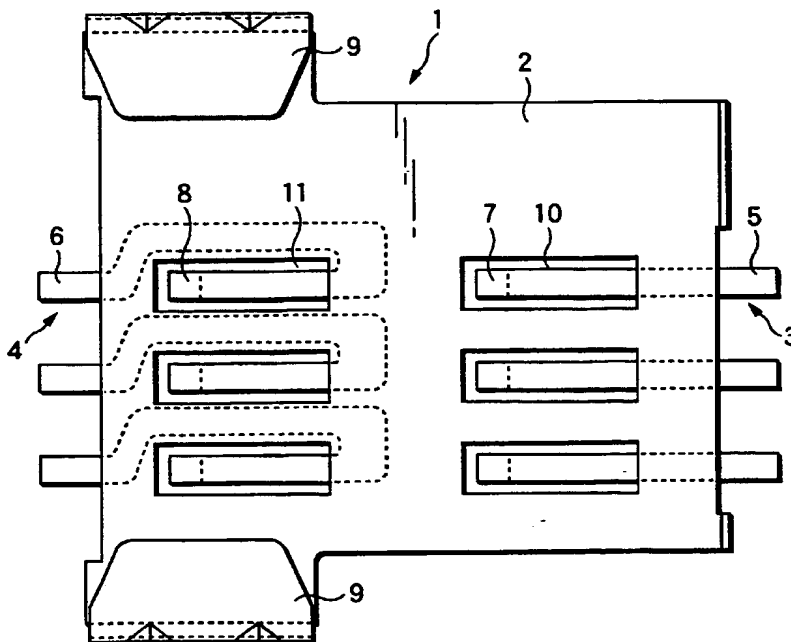
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CARD CONNECTOR AND PORTABLE TELEPHONE HAVING THE SAME



(57) Abstract: A card connector includes a base member and two sets of contact members which are provided on the base member. One end of the contact members serves as joining portions with respect to a circuit board of a portable telephone. The other ends of the contact members serve as contact portions with respect to a card. The joining portions are respectively disposed at mutually opposite ends of the base member. The contact portions are bent in a chevron shape and have terminations in a card fitting direction.

DESCRIPTION

CARD CONNECTOR AND PORTABLE TELEPHONE HAVING THE SAME

[Technical Field]

5 The present invention relates to a card connector and a portable telephone having the same, and more particularly to a card connector suitable for connection of a subscriber identification module (SIM) card and a portable telephone having the same.

[Background Art]

10 Conventionally, as a card connector of this type, a contacting device for an identification card disclosed in, for example, Japanese Patent No. 2,574,710 has been known. Disclosed in Fig. 5 of this patent publication is a contacting device for an identification card having contact regions
15 arranged in two rows (A, B), wherein two sets of contact members 81 and 82 having the same length are arranged in an interdigitated manner, and terminations of the contact members 81 and 82 are disposed on the opposite side. Further, in Fig. 6 of the aforementioned patent publication, there is disclosed
20 a contacting device for an identification card having contact regions arranged in two rows (A, B), wherein two sets of contact members 10 and 11 having mutually different lengths are arranged alternately, and terminations of the contact members 10 and 11 are arranged on the same side.

25 However, with the contacting device for an identification card disclosed in the aforementioned Fig. 5, if sliding insertion is assumed, since the terminations of the portions of the contact portions 81 and 82 which come into contact with contacts 1 of the card are mutually reversely

oriented with respect to the card fitting direction in the same way as Fig. 1 of the aforementioned publication, there has been a risk that the front end of the inserted card collides against the contact members when the card is slidably fitted.

5 In addition, with the contacting device for an identification card disclosed in Fig. 6, even if sliding insertion is assumed, since the terminations of the portions of the contact portions 10 and 11 which come into contact with the contacts 1 of the card are oriented in the same direction
10 in the same way as Fig. 2 of the aforementioned publication, there is no risk that the front end of the card collides against the contact members when the card is fitted. However, since the terminations of the contact portions 10 and 11 are arranged on the same side, soldering with respect to a printed circuit
15 board is performed only on one side, so that there has been a problem in that the printed circuit board cannot be stably fixed.

[Disclosure of the Invention]

20 The invention has been devised to overcome the above-described problems, and its object is to provide a card connector capable of effecting stable fixation to the printed circuit board and of preventing the collision at the time of the fitting of the card, as well as a portable telephone having the same.

25 In accordance with the invention, there is provided a card connector including a base member and two sets of contact members which are provided on the base member and whose one ends serve as joining portions with respect to a circuit board and whose other ends serve as contact portions with respect to a
30 card, characterized in that the joining portions of the two sets of contact members are respectively disposed at mutually

opposite ends of the base member, and that the contact portions of the two sets of contact members have terminations in a card fitting direction. By virtue of this construction, the card connector can be fixed stably to the circuit board at the joining portions, and it is possible to prevent the collision of the front end of the card against the contact portions at the time of the fitting of the card.

[Brief Description of Drawings]

Figs. 1(a) and 1(b) are diagrams illustrating a card connector in accordance with an embodiment of the invention;

Fig. 2(a) and 2(b) are diagrams for explaining the procedure for fitting the card to the card connector in accordance with the embodiment of the invention; and

Fig. 3 is a diagram for explaining a portable telephone having the card connector in accordance with the embodiment of the invention.

[Best Mode for Carrying Out the Present Invention]

Hereafter, a description will be given of an embodiment of the invention with reference to the drawings.

Figs. 1(a) and 1(b) are diagrams illustrating a card connector in accordance with an embodiment of the invention.

Here, Fig. 1(a) is a plan view, and Fig. 1(b) is a cross-sectional view.

As shown in Figs. 1(a) and 1(b), a card connector 1 is composed of a plate-like base member 2, two sets of contact members 3 and 4 fixed to the base member 2, and a pair of holding portions 9. The base member 2 has a substantially rectangular planar shape, and its left end side is formed to be wide. In the drawings, a card is loaded by being slid on the card connector 1 from the right-hand side toward the left-hand side. It should

be noted that, in the description that follows, the direction in which the card advances during the loading of the card is assumed to be the forward direction.

5 The set of three contact members 3 are formed by thin elongated metal pieces, and joining portions 5 which are soldered to a printed circuit board (not shown) are respectively provided at their ends where the card is fitted, while contact portions 7 which come into contact with the contacts of the card are respectively provided at the other ends. Each contact
10 member 3 extends in such a manner as to creep into the interior of the base member 2 from an end face of the base member 2 on the card fitting side thereof and then advance straight. Then, the contact member 3 is exposed from a wall surface of a through hole 10 with a rectangular cross section formed in the base
15 member 2 in correspondence with the contact portion 7. Further, the contact member 3 is bent upward from a substantially central portion in the through hole 10, becomes higher than the obverse surface (upper surface) of the base member 2 and forms a peak 7a, and the contact member 3 is subsequently bent downward to
20 its termination. In other words, the contact portion 7 is bent in a chevron shape and has a termination in the card fitting direction.

 Meanwhile, the contact members 4 are formed by thin elongated metal pieces, and joining portions 6 which are
25 soldered to the printed circuit board are respectively provided at their ends away from the card fitting side, while contact portions 8 which come into contact with the contacts of the card are respectively provided at the other ends. Each contact member 4 extends in such a manner as to creep into the interior
30 of the base member 2 from an end face opposite to its card fitting side, and the contact member 4 is bent leftward in terms of its

advancing direction before a through hole 11 with a rectangular cross section formed in the base member 2 in correspondence with the contact portion 8. Then, the contact member 4 advances straight in parallel with the through hole 11, and its direction is reversed after the contact member 4 has gone beyond the through hole 11, and the contact member 4 is exposed from a wall surface of the through hole 11 on the card fitting side thereof.

Further, the contact member 4 is bent upward from a substantially central portion of the interior of the through hole 11, becomes higher than the obverse surface (upper surface) of the base member 2 and forms a peak 8a, and the contact member 4 is subsequently bent downward to its termination. In other words, the contact portion 8 is bent in a chevron shape and has a termination in the card fitting direction. Thus, as the direction of the contact members 4 is reversed, the provision of the joining portions 6 on the side away from the joining portions 5 and the alignment of the direction of the contact portions 8 with the direction of the contact portions 7 are made compatible.

The pair of holding portions 9 are respectively attached to both side ends of a widened portion of the base member 2. The holding portions 9 are formed by bending a thin metal plate, and their one ends are respectively fixed to the side ends of the widened portion. By virtue of their resiliency, the holding portions 9 press from above and hold both sides of a front portion of the card fitted to the card connector 1.

Next, with reference to Figs. 2(a) and 2(b), a description will be given of the procedure of fitting the card.

When the card 21 is fitted to the card connector, a front end (left end in the drawing) of the card 21 is adjusted to the right ends of the holding portions 9, and the card 21 is slid leftward

while passing between the holding members 9 of the base member 2. At this time, the contact portions 7 and 8 of the contact members 3 and 4 are pressed by the lower surface of the card 21, are deflected downward in the through holes 10 and 11, and assume a state of being accommodated in the through holes 10 and 11, respectively, as indicated at the broken lines in the drawing. In addition, both contact portions 7 and 8 become gradually high from the card fitting side, and after forming the peak 8a, they are bent downward up to their terminations, so that a situation does not occur in which the front end of the card 21 collides against the contact portions 7 and 8 and damage the contact portions 7 and 8. It should be noted that a rear end portion of the card 21 is held by, for instance, an inner wall surface of the housing of the portable telephone, as will be described later.

Fig. 3 is a diagram for explaining the portable telephone having the card connector in accordance with the embodiment of the invention. This drawing shows a reverse surface-side housing 31. An opening 32 for attaching a cover-cum-battery is formed in this reverse surface-side housing 31 in such a manner as to extend from a substantially central portion to a lower edge thereof. A printed circuit board 33 of the main body of the portable telephone is exposed in the opening, and the card connector 1 is fixed on it by soldering. Preferably, a projection is formed in advance at a position which opposes the contact portions 7 when the cover-cum-battery is fitted in the opening 32, so as to hold the rear end portion of the card when the card is fitted.

Thus, with the card connector 1 in accordance with the embodiment of the invention, since the joining portions 5 and 6 at both ends of the base member 2 are joined to the printed

circuit board, the base member 1 can be stably fixed to the printed circuit board. In addition, since the contact portions 7 and 8 are bent in the chevron shape, and have terminations in the card fitting direction, it is possible to prevent the front end of the card from colliding against the contact members at the time of the loading of the card.

[Industrial Applicability]

As described above, in accordance with the invention, it is possible to provide a card connector having excellent advantages in that the card connector can be fixed stably to the circuit board, and that it is possible to prevent the collision of the front end of the card against the contact portions at the time of the fitting of the card.

While only a certain embodiment of the invention has been specifically described herein, it will be apparent that numerous modifications may be made thereto without departing from the spirit and scope of the invention.

CLAIMS

1. A card connector comprising:
a base member; and
two contact members provided on said base member, each
5 of said contact members including a joining portion with respect
to a circuit board at a first end thereof and a contact portion
with respect to a card at a second end thereof,
wherein the joining portions of said two contact
members are respectively disposed at mutually opposite ends of
10 said base member, and
wherein the contact portions of said two contact
members have terminations in a card fitting direction.
2. The card connector according to claim 1,
wherein one of said contact members extends from the
15 card-fitting-side end of said base member in a direction toward
the card fitting direction, and
wherein the other of said contact members extends from
the end opposite to the card-fitting-side end in a direction
opposite to the card fitting direction, and has its direction
20 reversed in the card fitting direction.
3. The card connector according to claim 1,
wherein said base member include a member for holding
the card, and
wherein said member for holding the card is disposed
25 at an edge portion of said base member opposite to a card fitting
side thereof.
4. The card connector according to claim 1,

wherein said base member include a through hole corresponding to the contact portion, and

wherein each of said contact members passes from an end face of said base member through an interior of said base member, and is exposed to an outside of said base member from the through hole.

5. A portable telephone comprising said card connector according to claim 1.

FIG.1(a)

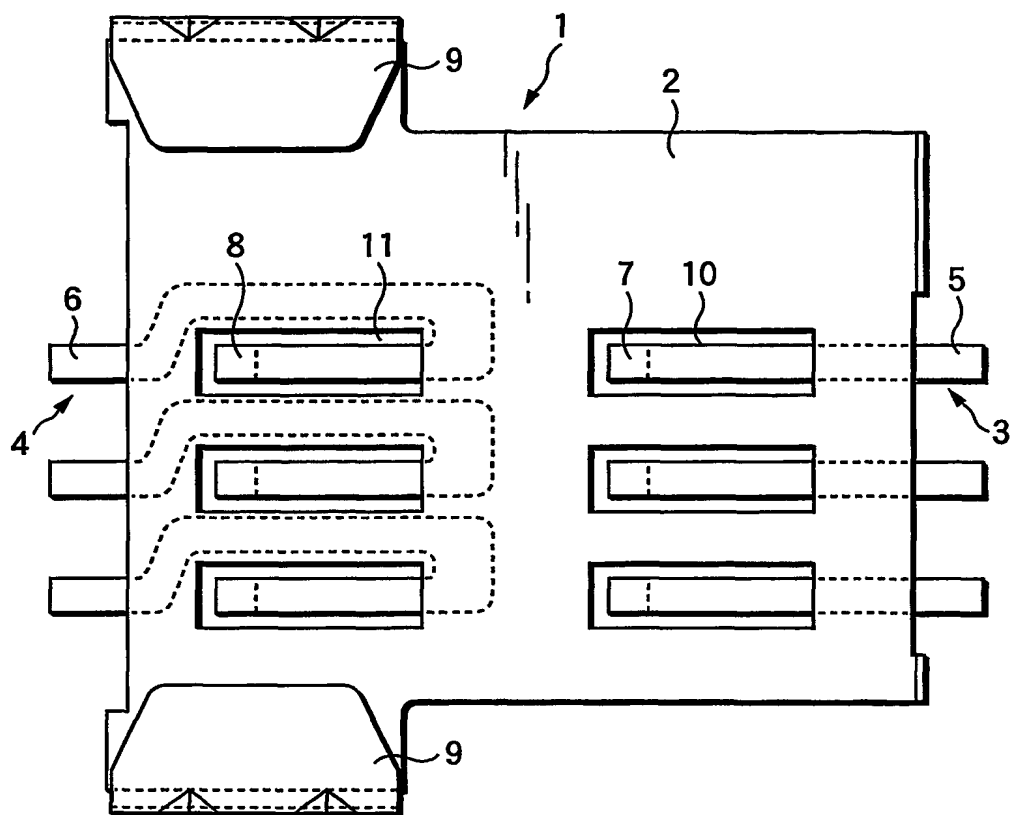


FIG.1(b)

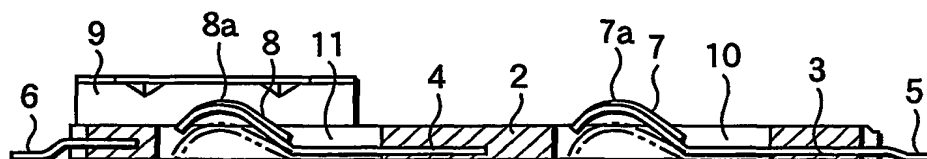


FIG.2(a)

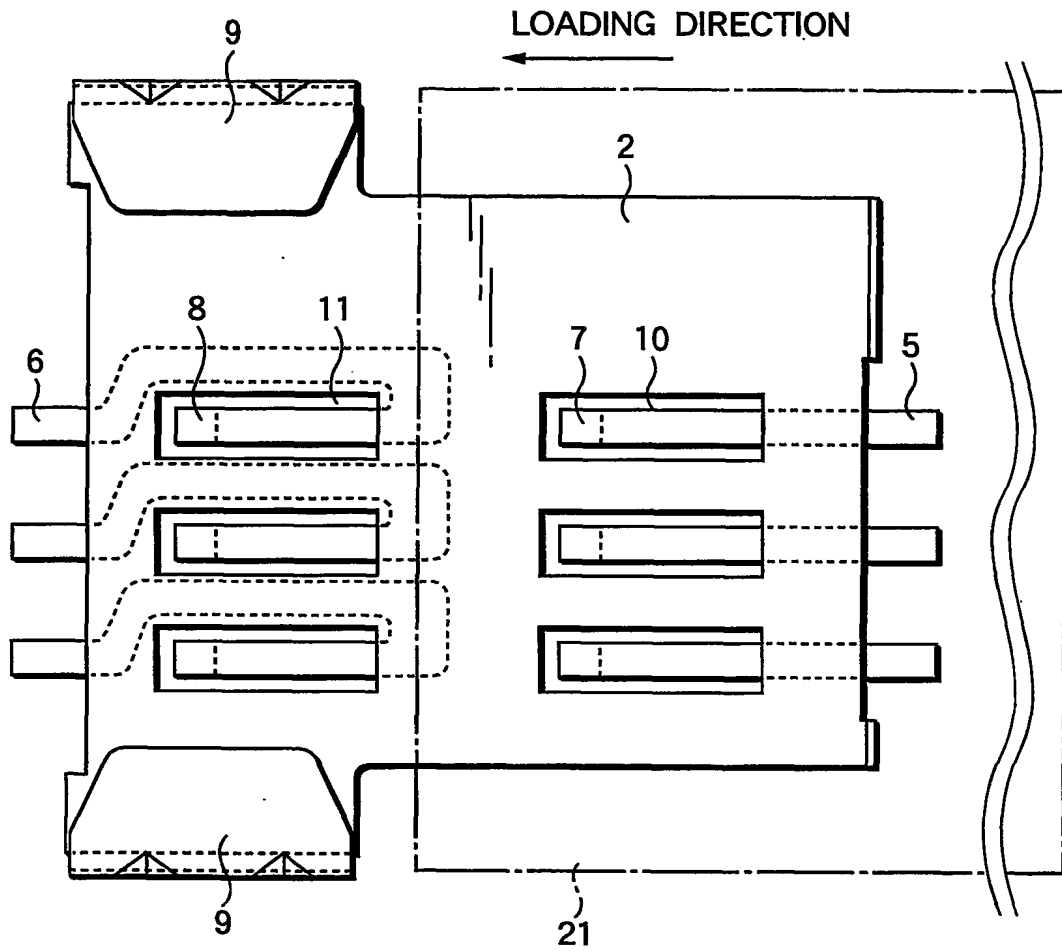


FIG.2(b)

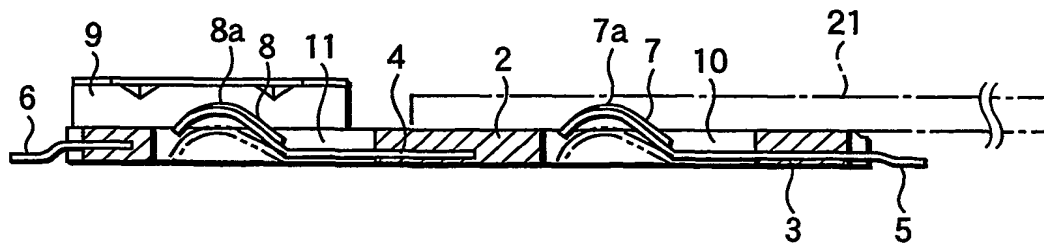
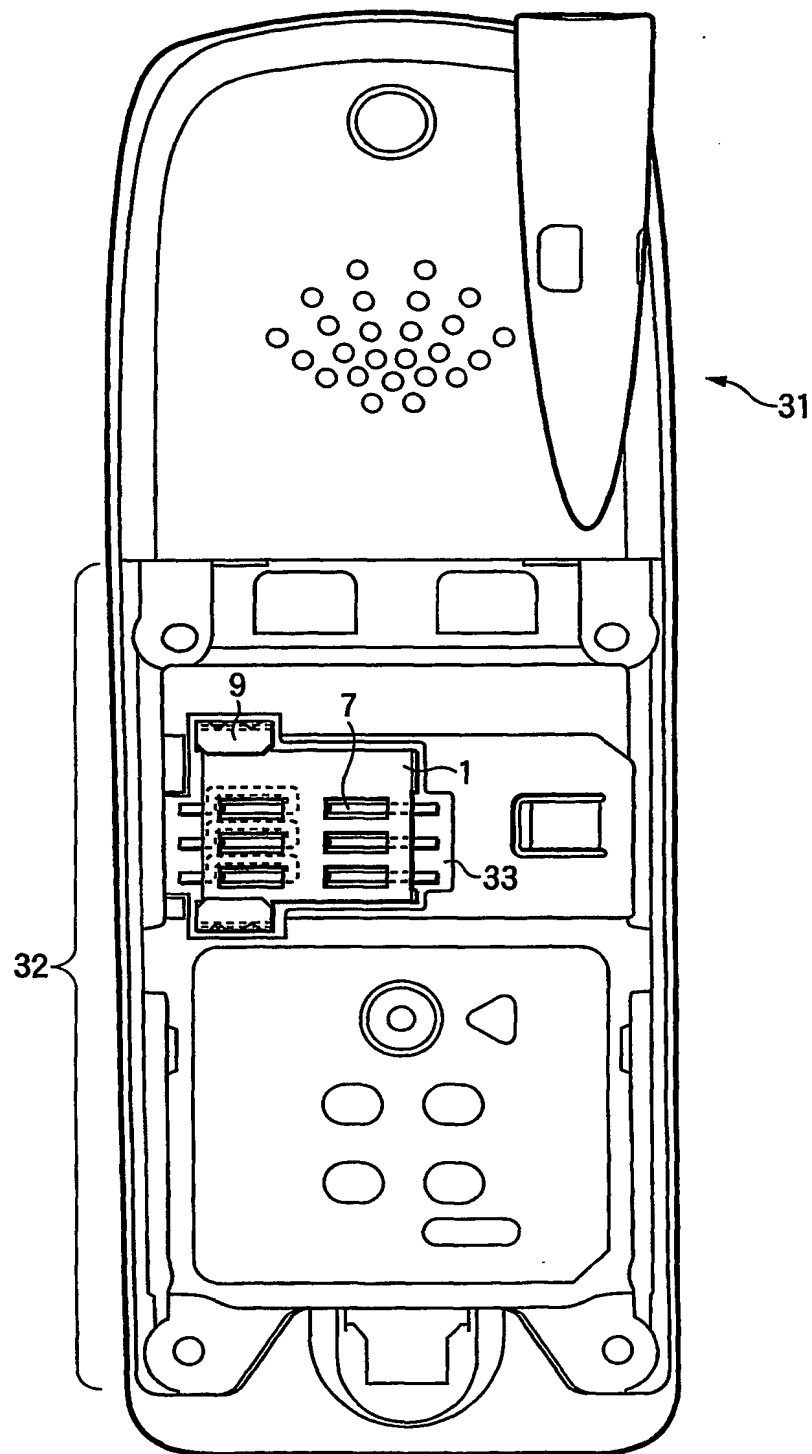


FIG.3



PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P - 3 7 0 7 0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/JP 01/01368	International filing date (day/month/year) 23/02/2001	(Earliest) Priority Date (day/month/year) 24/02/2000
Applicant MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1a



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 01/01368

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04B1/38 H04M1/02 G06K7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B G06K H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 13784 A (WHITAKER CORP) 2 April 1998 (1998-04-02) abstract page 3, line 26 -page 7, line 3 figures 1,2,6,7 ---	1-5
X,P	US 6 175 505 B1 (SUN HSUEH-WEN ET AL) 16 January 2001 (2001-01-16) abstract column 2, line 40 -column 3, line 45 figures 1-4 ---	1-5
X A	US 5 823 828 A (BRICAUD HERVE GUY ET AL) 20 October 1998 (1998-10-20) abstract column 2, line 36 -column 5, line 19 figures 1,2,7 -----	1,2,4,5 3

☐

Further documents are listed in the continuation of box C.

☒

Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

30 November 2001

Date of mailing of the international search report

06/12/2001

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 01/01368

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9813784	A	02-04-1998	AU 4588997 A EP 0928457 A1 JP 2001505681 T WO 9813784 A1	17-04-1998 14-07-1999 24-04-2001 02-04-1998
US 6175505	B1	16-01-2001	NONE	
US 5823828	A	20-10-1998	FR 2742561 A1 EP 0738983 A1 JP 9274976 A	20-06-1997 23-10-1996 21-10-1997